

39. (New) The method of operating a printing ink cartridge reproducing device of claim
37 wherein the reproduction control device is within a printer.

40. (New) The method of operating a printing ink cartridge reproducing device of claim
37 wherein the reproduction control device is within a computer.

REMARKS

Claims 1-35 are all the claims pending in the application. The specification stands objected to based on a number of informalities. The Applicant has amended the specification and corrected the informalities as the Examiner has suggested. Therefore, Applicant respectfully requests that the objection to the specification be reconsidered and withdrawn.

Claims 2, 7, 8, 16, 18, 22, 23, 27-32 and 35 stand objected to based on a number of syntax and idiomatic English informalities. Applicant has amended the claims and corrected the informalities as the Examiner has suggested as shown above, the scope of the claims have not been narrowed. Therefore, Applicant respectfully requests that the objection to claims 2, 7, 8, 16, 18, 22, 23, 27-32 and 35 be reconsidered and withdrawn.

Claims 3-5, 13, 21-23, 31 and 35 stand rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Applicant has amended the claims and corrected the antecedent basis informalities as the Examiner has suggested and as a result, the scope of the claims have not been narrowed. Therefore, Applicant respectfully requests that the rejection to claims 3-5, 13, 21-23, 31 and 35 under 35 U.S.C. § 112(2) be reconsidered and withdrawn.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/318,268

Claims 1-7, 9-19, 21-22, 27-28, 30 and 33-35 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Cowger et al. (U.S. Patent No. 5,788,388). Claims 8, 20, and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cowger et al. in view of Childers et al. (U.S. Patent No. 6,161,913). Claims 24-26, 29, 31 and 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cowger et al. in view of Emanuel (U.S. Patent No. 6,036,304). Applicant respectfully traverses these rejections for at least the reasons discussed below.

Regarding newly amended claim 1 and original claim 8, Cowger fails to teach the use and storage of “data related to environment of use of the ink cartridge.” Recognizing that Cowger fails to disclose this limitation, the Examiner relies on the Childers patent to meet the requirement of storing data related to an environment in which the ink cartridge is used. Specifically, the Examiner references column 2, lines 1-7 of Childers to support this assertion. However, Childers discloses only that the amount of stored air that has accumulated in the ink cartridge effects the lifetime of the inkjet printhead. Applicant submits that storing the amount of accumulated air is not equivalent to the claim limitation of storing data relating to the environment in which the ink cartridge is used. The data stored in the present invention relates to the environmental conditions exterior to the ink cartridge and not to the air within the ink cartridge. In fact, Childers does not disclose or suggest that the environmental conditions exterior to the ink cartridge are useful and consequently, Childers does not disclose or suggest storing these conditions. Therefore, Applicant respectfully requests that the rejection of claims 1 and 8 be reconsidered and withdrawn.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/318,268

Since claims 2, 6, 9, 10, 11 and 12 depend from claim 1, Applicant respectfully submits that these claims are allowable by virtue of their dependency from claim 1 and for at least the reasons discussed above. Accordingly, Applicant respectfully requests that the rejection of claims 2, 6, 9, 11 and 12 be reconsidered and withdrawn.

Regarding newly amended claims 3, 5, and 33-34, it has been rewritten in independent form and therefore has not been narrowed in scope. Moreover, Cowger fails to teach or suggest storing data related to a maintenance processing required for the reproduction of the ink cartridge. The Examiner relies on column 2, lines 30-33 and column 5, lines 22-33 of Cowger as disclosing this information. However, upon a closer reading of those sections and Cowger in general, Cowger does not mention or suggest the need for storing information related to maintenance processing. Cowger only teaches storing data related to the condition of the ink. Specifically, Cowger teaches storing when and where the ink came from, when the ink was manufactured, the ink's shelf life, the ink's drying time and ink chemistry. It does not teach storing such data as when parts were replaced on the cartridge, the period of blank ejection and the ejection in a capped condition, the condition of cleaning of the ink cartridge and the condition of exchange of parts at the time the ink cartridge is refilled, and exchange of parts, the latest usage time of the ink cartridge, the time of the ink end, the usage condition or environment of the ink cartridge. Since Cowger does not disclose the data required in claims 3, 5, and 33-34, Applicant requests that the rejection under 35 U.S.C. § 102(e) be reconsidered and withdrawn.

Regarding claim 4, as discussed above, Cowger fails to teach or suggest storing of data related to a condition of cleaning. Cowger only teaches or suggests the need to store data related

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/318,268

to the ink itself and any other type of data. This is further evidenced by the Examiner's silence regarding any teaching in Cowger regarding storing data related to a condition of cleaning. Therefore, Applicant respectfully requests that the rejection of claim 4 under 35 U.S.C. § 102(e) be reconsidered and withdrawn.

Regarding claim 7, Cowger fails to teach or suggest storing "data related to the time of final ink depletion of the ink cartridge." Although Cowger discloses detecting "[w]hen the ink level drops below the selected level," Cowger does not disclose storing any data relating to the time when the ink level drops below the selected level. For example, the time of final depletion can be used as one of the factors for determining the use of the ink cartridge. The Examiner relies on the disclosure in column 2, lines 30-33 and column 5, lines 22-33. In neither of these passages of the Cowger disclosure is there any discussion about storing related to the time of final ink depletion of the ink cartridge. In fact, there is no mention of storing data or even creating data relating to the time of final ink depletion. Since at least this limitation of claim 7 is not disclosed in the Cowger reference, the rejection under 35 U.S.C. § 102(e) is improper. Accordingly, Applicant respectfully requests that the rejection of claim 7 under 35 U.S.C. § 102(e) be reconsidered and withdrawn.

Regarding claim 13, Cowger fails at least to teach or suggest an ink cartridge that is "operable to alter an ink discharge operation based on the stored data relating to the minimum ink amount and the residual ink amount." Cowger merely discloses using an emitter 90 and a detector 92 to determine whether the ink in the reservoir has reached a predetermined level. Cowger does not disclose storing a minimum ink amount and a residual ink amount to be used to

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/318,268

control and/or alter the normal ink discharge operation. For example, Cowger does not disclose altering the ink discharge operation based on the difference between the minimum ink amount and the residual ink amount. Cowger simply uses the emitter/detector to determine if the ink reservoir is empty. See Cowger at col. 6, lines 15-18. Cowger does not use the any stored date to alter the normal ink discharge operation. In fact, Cowger only uses the stored information to indicate to the user when the ink is depleted and needs to be refilled. Since at least this limitation of claim 13 is not disclosed in the Cowger reference, the rejection under 35 U.S.C. § 102(e) is improper. Accordingly, Applicant respectfully requests that the rejection of claim 13 under 35 U.S.C. § 102(e) be reconsidered and withdrawn.

Regarding claims 14-23 and 35, Cowger fails to teach or suggest controlling the charging of ink into a printhead in accordance with data stored in the memory device. The Examiner relies on column 4, lines 41-65, as disclosing this information. However, upon a closer reading of that section and Cowger in general, Cowger only teaches "counting" the drops of ink dispersed. It does not teach controlling the charging of the ink into the printhead based on the stored data. In the present invention, the stored data is used when charging the ink into the printhead so that highest print quality is obtained regardless of whether the ink cartridge is new or used. Moreover, since Cowger does not teach storing data other than the amount of ink in the cartridge, it cannot control the charging of the ink into the printhead based on data that it does not keep. Accordingly, Applicant respectfully requests that the rejection of claims 14-23 and 35 be reconsidered and withdrawn.

Regarding claims 24-26, as the Examiner has noted, Cowger does not teach that the control device judges whether a cleaning operation is necessary in accordance with the stored data of the relative value of the residual ink and the minimum ink value. However, the Examiner relies on the teachings of Emanuel to teach the deficiencies of Cowger. Emanuel teaches using an external flushing device to flush the ink delivery system with a flushing solution such as de-ionized water when the user desires to change the ink cartridge. Applicant respectfully submits that the flushing device of Emanuel is not equivalent to the cleaning device of the present invention because the present invention does not require external use by the user and can be performed using ink at times other than when the user is replacing the used ink cartridge. Further, neither Cowger or Emanuel or the combination of the two teach monitoring the condition of the printhead during use to determine whether or not the printhead needs to be cleaned and neither teaches performing the cleaning operation by the printing apparatus automatically when it is determined that the printhead needs cleaning.

Additionally, neither reference teaches storing data related to residual ink and therefore, neither reference can possibly teach judging whether a cleaning operation is necessary based on data that it does not keep. Said differently, claim 24 requires the control device to judge whether a cleaning operation is necessary based on the data stored in the memory device. The memory device contains data related to the residual ink in the ink cartridge. Therefore, in order for the control device to judge whether a cleaning operation is necessary, there must be data related to residual ink stored in the memory device. However, since neither reference teaches storing any information related to residual ink, neither reference nor the combination of the two can possibly

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/318,268

teach judging whether a cleaning operation is necessary based on data related to residual ink because that information is not stored in either reference. Accordingly, since neither reference teaches the recitations of claims 24-26, Applicant respectfully requests that the rejections under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

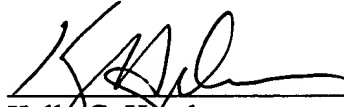
Regarding claims 27-32, Cowger does not teach a cartridge reproducing device. Cowger teaches an ink jet cartridge and not a cartridge reproducing device. Further, Cowger does not teach any device that causes data related to the ink cartridge and not solely the ink within the cartridge to be stored in the memory device. Moreover, the Examiner is silent and has not indicated any reference which discloses a cartridge reproducing device. In the Office Action, the Examiner states that Cowger shows an ink cartridge for an ink jet type printing apparatus but the Examiner does not state that Cowger shows a cartridge reproducing device. Accordingly, Applicant respectfully requests that the rejection of claims 27-32 be reconsidered and withdrawn.

Reconsideration and allowance of all claims are respectfully requested in view of the preceding remarks. In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/318,268

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

On page 2, please substitute the following paragraph for the second full paragraph on the page:

Therefore, it has been proposed a method as disclosed in Japanese Patent Unexamined Publication No. 5-193127, in which an ink cartridge is provided with a memory device, and characteristics of ink, the amount of the ink, drive conditions and so on are stored in the memory device, whereas in a printing apparatus, the drive conditions are adjusted in accordance with ~~these~~ this information.

On page 7, please substitute the following paragraph for the fifth full paragraph on the page:

When the ink cartridge 10, 20 is mounted onto the carriage 25 42, the printing control device 51 reads cartridge data stored in the semiconductor memory device 32 of the ink cartridge 10, 20 (Step B), and data indicative of the time of attachment is stored onto the semiconductor memory device 32 of the ink cartridge 10, 20 (Step C), and then it is judged from the number of reproducing time whether or not the cartridge is one to be reproduced (Step D). If the cartridge is one to be reproduced, the control data is adjusted (Step E).

On page 8, please substitute the following paragraph for the second full paragraph on the page:

The ink in the ink cartridge 10, 20 is consumed as a result of the printing operation and the clogging prevention operation, and when the ink end is detected (Step H), data indicative of the time of the ink end is stored as cartridge data (Step I) in the semiconductor memory device 32 of the ink cartridge 10, 20 under the control of the printing control device 51. When attaching the ink cartridge, it is judged from the number of reproduction read (Step J) whether or not the next reproduction is possible (Step K), whether or not the cartridge container has reached the limit of the lifetime (Step L), whether or not a predetermined time period has elapsed after the ink end of the ink cartridge was detected (Step M), and whether or not the environment of use, monitored by the use environment detection means 56, has adversely affected the ink cartridge (Step N).

On page 9, please substitute the following paragraph for the second full paragraph on the page:

According to the embodiment described above, the semiconductor memory device 32 stores therein fixed data such as production date, lifetime, the possible number of reproduction, and the other data such as the actual number of reproduction applied to the subject ink cartridge, cleaning condition during the reproduction of the ink cartridge, maintenance condition such as exchange of parts, the latest usage time of the ink cartridge, the time of the ink end, the usage condition or environment of the ink cartridge. In addition, the memory device may also store therein a preset minimum ink amount to be held in the ink cartridge. That is, the minimum

amount of ink is stored at the time when the ink cartridge is shipped from the factory, and the residual amount of ink when the ink cartridge is mounted on the printing device is recorded. Those data are read out ~~for causing~~ to prevent the printhead from being damaged.

On page 11, please substitute the following paragraph for the third full paragraph on the page:

Under the operation as described above, when both the ink cartridges contain therein sufficient amount of ink, the cleaning control device 57 executes a normal cleaning operation which requires relatively large quantity of ink (STEP M). After the normal cleaning operation is finished (STEP N), the process goes back to STEP A.

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) An ink cartridge for an ink jet type printing apparatus having a print head, the ink cartridge comprising:

a container having an ink chamber for containing ink therein;

an ink supply port for ~~ejecting~~ supplying the ink from said ink chamber to the print head;

and

a memory device for storing data related to the history of the ink cartridge, data related to environment of use of the ink cartridge, and data related to cleaning of the print head, said memory device having ~~has~~ an area in which the data is stored in a rewritable manner.

2. (Amended) An ink cartridge according to claim 1, wherein the data includes data related to the number of reproduction ~~time~~ times of the ink cartridge.

3. (Amended) ~~An ink cartridge according to claim 1,~~ An ink cartridge for an ink jet type printing apparatus having a print head, the ink cartridge comprising:

a container having an ink chamber for containing ink therein;

an ink supply port for supplying the ink from said ink chamber to the print head;

a memory device for storing data related to the history of the ink cartridge, said memory device having an area in which the data is stored in a rewritable manner; and

wherein the data includes data related to a maintenance processing required for ~~the~~ a reproduction of the ink cartridge.

4. (Amended) ~~An ink cartridge according to claim 3,~~ An ink cartridge for an ink jet type printing apparatus having a print head, the ink cartridge comprising:

a container having an ink chamber for containing ink therein;

an ink supply port for supplying the ink from said ink chamber to the print head;

a memory device for storing data related to the history of the ink cartridge, said memory device having an area in which the data is stored in a rewritable manner; and

wherein the data includes data related to a maintenance processing required for a reproduction of the ink cartridge.;

wherein the data includes data related to a condition of cleaning.

5. (Amended) ~~An ink cartridge according to claim 3,~~ An ink cartridge for an ink jet type printing apparatus having a print head, the ink cartridge comprising:

a container having an ink chamber for containing ink therein;

an ink supply port for supplying the ink from said ink chamber to the print head;

a memory device for storing data related to the history of the ink cartridge, said memory device having an area in which the data is stored in a rewritable manner;

wherein the data includes data related to a maintenance processing required for a reproduction of the ink cartridge; and

wherein the data includes data related to a condition of exchange of a part of the ink cartridge.

7. (Amended) ~~An ink cartridge according to claim 1,~~ An ink cartridge for an ink jet type printing apparatus having a print head, the ink cartridge comprising:

a container having an ink chamber for containing ink therein;

an ink supply port for supplying the ink from said ink chamber to the print head;

a memory device for storing data related to the history of the ink cartridge, said memory device having an area in which the data is stored in a rewritable manner; and

wherein the data includes data related to the time of final ink ~~end~~ depletion of the ink cartridge.

8. (Amended) ~~An ink cartridge according to claim 1,~~ An ink cartridge for an ink jet type printing apparatus having a print head, the ink cartridge comprising:

a container having an ink chamber for containing ink therein;

an ink supply port for supplying the ink from said ink chamber to the print head;

a memory device for storing data related to the history of the ink cartridge, said memory device has an area in which the data is stored in a rewritable manner; and

wherein the data includes data related to an environment ~~of use of~~ in which the ink cartridge is used.

13. (Amended) An ink cartridge for an ink jet type printing apparatus having a print head, the ink cartridge comprising:

a container having an ink chamber for containing ink therein;

an ink supply port for ~~ejecting~~ supplying the ink from said ink chamber to the print head;

and

a memory device for storing data related to the ink or the ink cartridge, said memory device ~~stores~~ storing therein data relating to a minimum ink amount to be contained in the ink cartridge, ~~and~~ said memory device having an area in which the data indicative of ~~the~~ a residual ink amount is stored in a rewritable manner;

wherein said ink cartridge is operable to alter an ink discharge operation based on the stored data relating to the minimum ink amount and the residual ink amount.

14. (Amended) An ink-jet printing apparatus comprising:

a print head for ejecting ink droplets;

an ink cartridge containing ink therein for supplying the ink to said print head;

a memory device storing data related to the ink cartridge, data related to environment of use of the ink cartridge, and data related to cleaning of the print head; ~~and~~

a control device accessible to said memory device for controlling said print head in accordance with data supplied from the exterior, said control device controlling a charging of the ink into said print head in accordance with data, stored in said memory device, when said ink cartridge is attached to the printing apparatus; and

said control device determines whether the print head needs cleaning and controls the cleaning operation.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/318,268

16. (Amended) An ink-jet printing apparatus according to claim 14, wherein the control of the ink charging operation is directed to the amount of ~~drawing of the ink~~ drawn.

18. (Amended) An ink-jet printing apparatus according to claim 17, wherein said data, related to said conditions of use, is the time of ink ~~end~~-depletion of said ink cartridge.

21. (Amended) An ink-jet printing apparatus according to claim 14, wherein said control device judges from the data, stored in said memory device, whether or not ~~the~~ a next reproduction is possible.

22. (Amended) An ink-jet printing apparatus according to claim 14, wherein said control device judges whether or not the next reproduction is possible in accordance with the data stored in said memory device, and the control device ~~causes to display~~ displays an indication that the ink cartridge is to be discarded if when it judges that the reproduction is impossible.

23. (Amended) An ink-jet printing apparatus according to claim 21, wherein said judgment is made in accordance with the number of reproduction, a lifetime, a time period after detection of ink ~~end~~-depletion, and an environment of use.

24. (Amended) An ink-jet printing apparatus comprising:

a print head for ejecting ink droplets;

an ink cartridge containing ink therein for supplying the ink to said print head;

a memory device storing data representative of a preset minimum ink amount and a residual ink in the ink cartridge; and

a control device accessible to said memory device for controlling said print head in accordance with data supplied from the exterior, said control device judging whether a cleaning operation is necessary in accordance with the data stored in said memory device.

27. (Amended) A cartridge reproducing device for an ink cartridge for an ink jet type printing apparatus having a print head, the reproducing device comprising:

means for reading data, related to a history of use of the ink cartridge to be reproduced, from a memory device provided on the ink cartridge; and

a control device which controls reproduction processing apparatus in accordance with said data, and causes at least data, representing the number of reproduction and the time of reproduction, to be stored in said memory device after the reproducing operation is finished; and

said control device determines when and if the print head needs cleaning and controls the cleaning.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/318,268

29. (Amended) A reproducing device according to claim 27, wherein said reproduction processing apparatus includes at least a cartridge cleaning device, and an ink injecting device.

31. (Amended) A reproducing device according to claim 27, wherein said control device controls the degree of cleaning by ~~said~~ cleaning means in accordance with the data in said memory device.

33. (Amended) An ink-jet printing apparatus comprising:

- a print head for ejecting ink droplets;
- an ink cartridge containing ink therein for supplying the ink to said print head;
- a memory device storing data related to the ink cartridge, data related to environment of use of the ink cartridge, and data related to cleaning of the print head; and
- a control device accessible to said memory device for controlling said print head in accordance with data supplied from the exterior, said control device judges, from the data stored in said memory device, whether ~~or not~~ the next reproduction is possible.

35. (Amended) An ink-jet printing apparatus according to claim 14, wherein said control device judges whether ~~or not the~~ a next reproduction is possible in accordance with the data

stored in said memory device, and the control device ~~causes to display~~ displays that the ink cartridge is discarded if it judges that the reproduction is impossible.

Please add the following new claims:

36. (New) A method of operating a printing ink cartridge reproducing device having a data memory device, a reproducing control device, an ink charging device and an ink discharge device, said method comprising:

reading ink cartridge data from an ink cartridge having an ink memory circuit;

evaluating the ink cartridge data using the reproducing control device;

determining whether regeneration of the ink cartridge is possible; and

recharging the ink cartridge using the ink charging device if the reproducing control device determines that regeneration of the ink cartridge is possible.

37. (New) The method of operating a printing ink cartridge reproducing device of claim 36 wherein recharging the ink cartridge comprises:

discharging residual ink from the ink cartridge using the ink discharge device;

determining whether a part of the ink cartridge needs to be replaced using the reproducing control device;

replacing the part of the ink cartridge that needs to be replaced;

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/318,268

determining whether cleaning of the ink cartridge is needed by the reproducing control device;

cleaning the ink cartridge if the reproducing control device determines that the ink cartridge needs to be cleaned;

determining whether the ink cartridge needs to be washed with ink using the reproducing control device; and

washing the ink cartridge if the reproducing control device determines that the ink cartridge needs to be washed with ink.

38. (New) The method of operating a printing ink cartridge reproducing device of claim 37 wherein the reproducing control device uses data stored in the data memory device and data stored in the ink memory circuit.

39. (New) The method of operating a printing ink cartridge reproducing device of claim 37 wherein the reproduction control device is within a printer.

40. (New) The method of operating a printing ink cartridge reproducing device of claim 37 wherein the reproduction control device is within a computer.